Remarks/Arguments:

Reconsideration of the application is requested.

Claims 1-40 remain in the application. Claims 15-40 have been withdrawn from consideration.

In the third paragraph on page 2 of the Office action, claims 1-2, 4-5, 7-9, 11-12, and 14 have been rejected as being fully anticipated by Palagonia (U.S. Patent No. 5,874,782) under 35 U.S.C. § 102.

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claims 1 and 8 call for, *inter alia*:

the at least one elevation being formed of an insulating material having sufficient flexibility to absorb stresses occurring in the contact zone as a result of at least one of

the group consisting of thermal loading and mechanical loading.

It is noted that the Palagonia reference has already been discussed on page 4, lines 16-24 of the specification of the instant application.

The Palagonia reference discloses a method for mounting a chip at a pre-determined fixed height above a substrate, which is achieved through the use of contact pads. Palagonia teaches a chip (22) mounted on a PCB (50). The chip (22) is electrically connected by solder connections (54) between the contact pads (34) on the chip (22) and board contacts (52) of the circuit board (50). These electrical connections are given mechanical support by filling the space between the top side of the board (50) and the bottom side of the chip (22) with an insulative epoxy (56). Therefore, the chip has a firm mechanical connection with the board (50).

The present invention is very different than Palagonia. The different linear thermal expansion coefficients of a chip and a substrate cause mechanical stresses in the contacts which in turn leads to failure of the connection. The problem addressed by the present invention is to improve the resistance of the electrical contacts between the chip and the

substrate with respect to the mechanical stresses caused by repeated thermal loading. This problem is solved in the instant application by providing flexible contacts on the chip.

As can be seen in Fig. 6 of the instant application, the contacts include a metallic layer 8 deposited on flexible insulating elevations 3 in order to create the contacts 1. The contacts are connected to terminals 12 of the internal circuitry of the chip 6 via metallic conductor runs 4 disposed on the surface of the chip 6. A solder ball 5 may be used to connect the contacts 1 of the chip to a substrate, such as a printed circuit board which is not shown in Fig. 6.

The size, shape, and material of the flexible elevations 3 of the instant application are carefully chosen to provide the necessary lateral flexibility of the contact (page 18, lines 12-20). Palagonia discloses that the height and material of the bump (32) is unimportant (column 5, lines 13-16 and column 6 lines 13-19). Palagonia does not disclose that the size, shape, and material of the flexible elevations are carefully chosen to provide the necessary lateral flexibility of the contact. Therefore, it is applicants' position that Palagonia does not show or suggest the use of a flexible elevation to

improve the resistance of an electrical contact with respect to mechanical stresses.

Moreover, as stated above, the purpose of the present invention is to provide a flexible electrical contact between a chip and a substrate. Therefore, the mechanical properties of each part of the contact are very important. However, it is known that the adhesion properties of a metal layer on an insulator, particularly plastic, are inherently poor. Due to mechanical stresses, there is a danger that the metal layer on the contact pad may delaminate from the flexible elevation and/or the metal conductor run may delaminate from the insulating layer causing the electrical contact to fail.

Therefore, in the instant application, the surface of the component is roughened in the areas which receive the metal coating (i.e. the contact pad of the flexible elevation and the insulating coating where the conductor runs are provided) (page 15, lines 16-23 and Fig. 20), in order to improve the adhesion properties between the metal coating and the flexible elevation and the insulating layer.

In the instant application the roughened surface enables an improved nucleation of the metallic coating and, therefore, an improved adhesion of the metal coating to the plastic. This

is important because without good adhesion, a reliable electrical connection and the desired flexibility of the contact cannot be achieved. The use of a roughened surface to improve the nucleation of a metal coating thereby improving the adhesion of a metal layer to a flexible elevation is not taught by Palagonia.

Based on the above-provided comments the Palagonia reference does not show the at least one elevation being formed of an insulating material having sufficient flexibility to absorb stresses occurring in the contact zone as a result of at least one of the group consisting of thermal loading and mechanical loading, as recited in claims 1 and 8 of the instant application.

Since claims 1 and 8 are believed to be allowable, dependent claims 2, 4-5, 7, 9, 11-12, and 14 are believed to be allowable as well.

In the last paragraph on page 3 of the Office action, claims 3 and 10 have been rejected as being obvious over Palagonia (U.S. Patent No. 5,874,782) in view of Chen et al. (U.S. Patent No. 5,970,687) under 35 U.S.C. § 103. Chen et al. do not make up for the deficiencies of Palagonia. Since claims 1

and 8 are believed to be allowable, dependent claims 3 and 10 are believed to be allowable as well.

In the second paragraph on page 4 of the Office action, claims 6 and 13 have been rejected as being obvious over Palagonia (U.S. Patent No. 5,874,782) in view of Lee et al. (U.S. Patent No. 6,140,456) under 35 U.S.C. § 103. Lee et al. do not make up for the deficiencies of Palagonia. Since claims 1 and 8 are believed to be allowable, dependent claims 6 and 13 are believed to be allowable as well.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claims 1 or 8. Claims 1 and 8 are, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claims 1 or 8, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 1-14 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel respectfully requests a telephone call so that, if possible, patentable language can be worked out.

Applic. No. 10/022,226
Amdt. dated January 15, 2004
Reply to Office action of October 16, 2003

If an extension of time for this paper is required, petition for extension is herewith made.

Please charge any other fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner & Greenberg P.A., No. 12-1099.

Respectfully submitted,

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For Applicant(s)

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